

Amendments to the Claims:

This listing of claims will replace the claims in the application.

Listing of Claims:

Claims 1-4 (withdrawn)

Claims 5 (original) A tool for steering a downhole drilling apparatus with respect to a geological bed boundary in an earth formation, said tool having a tool axis and comprising:

a transmitter antenna disposed within a plane oriented at a first angle with respect to the tool axis for transmitting a first electromagnetic wave into said formation, wherein said first electromagnetic wave induces an electric current in said formation and said electric current generates a second electromagnetic wave in said formation;

a first receiver antenna spaced apart from said transmitter antenna at a specified receiver location along the tool axis and disposed within a plane oriented at a second angle with respect to the tool axis, said second angle being different from said first angle, for receiving said second electromagnetic wave and generating a first response signal based upon said second electromagnetic wave, said first response signal being proportional to the electrical resistivity of a portion of said formation;

a second receiver antenna spaced apart from said transmitter antenna at said specified receiver location and disposed within a plane oriented at a third angle with respect to the tool axis, said third angle being substantially the negative of said second angle, for receiving said second electromagnetic wave and generating a second response signal based upon said second electromagnetic wave, said second response signal being proportional to the electrical resistivity of a portion of said formation; and

a processor in communication with said first and second receiver antennas for (a) receiving said first and second response signals and (b) generating an output signal as a

function of borehole depth based on said correlated first and second response signals, wherein said output signal is indicative of the relative position of said tool with respect to said geological bed boundary as said tool approaches said geological bed boundary.

Claim 6 (original) The tool of claim 5 wherein said first angle is substantially a right angle.

Claim 7 (original) The tool of claim 6 wherein said second angle is about +45 degrees and said third angle is about -45 degrees.

Claims 8 - 12 (cancelled)

Claims 13 - 20 (withdrawn)

Claims 21 - 26 (cancelled)

Claims 27 - 31 (withdrawn)

Claim 32 (original) A method for steering a downhole drilling apparatus with respect to a geological bed boundary in an earth formation, said drilling apparatus including an electromagnetic propagation logging tool having a tool axis, a transmitter antenna disposed within a plane oriented at a first angle with respect to the tool axis, a first receiver antenna spaced apart from said transmitter antenna at a specified receiver location along the tool axis and disposed within a plane oriented at a second angle with respect to the tool axis, said second angle being different from said first angle, a second receiver antenna spaced apart from said transmitter antenna at said specified receiver location and disposed within a plane oriented at a third angle with respect to the tool axis, said third angle being substantially the negative of said second angle, and a processor in communication with said transmitter antenna and said first and second receiver antennas, said method comprising the steps of:

(a) transmitting a first electromagnetic wave into said formation using said transmitter antenna, wherein said first electromagnetic wave induces an electric current in said formation and said electric current generates a second electromagnetic wave in said formation;

(b) receiving said second electromagnetic wave with said first receiver antenna thereby generating a first response signal based upon said second electromagnetic wave, said first response signal being proportional to the electrical resistivity of a portion of said formation;

(c) receiving said second electromagnetic wave with said second receiver antenna thereby generating a second response signal based upon said second electromagnetic wave, said second response signal being proportional to the electrical resistivity of a portion of said formation;

(d) sending said first and second response signals to said processor;

(e) operating said processor to generate a first differential signal based on said first response signal and said first electromagnetic wave;

(f) operating said processor to generate a second differential signal based on said second response signal and said first electromagnetic wave;

(g) operating said processor to produce an output signal as a function of borehole depth based on said first and second differential signals, wherein said output signal is indicative of the relative position of said tool with respect to said geological bed boundary as said tool approaches said geological bed boundary; and

(h) controlling the drilling direction of said drilling apparatus in response to said output signal.

Claim 33 (original) The method of claim 32 wherein:

said first differential signal comprises the phase difference between said first response signal and said first electromagnetic wave; and

said second differential signal comprises the phase difference between said second response signal and said first electromagnetic wave.

Claim 34 (original) The method of claim 32 wherein:

said first differential signal comprises the amplitude ratio of said first response signal and said first electromagnetic wave; and

said second differential signal comprises the amplitude ratio of said second response signal and said first electromagnetic wave.

Claim 35 (original) The method of claim 32 wherein said output signal comprises the difference of said first and second differential signals.

Claim 36 (original) The method of claim 32 wherein said output signal comprises the ratio of said first and second differential signals.

Claims 37 -41 (cancelled)

Claims 42 - 55 (withdrawn)

Claims 56 - 62 (cancelled)